

# Routes of Exposure Among Terrestrial Species

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# Does Exposure Occur?

- **Parsons, 2001 Biotransport Study**
  - AFIERA and Parsons Engineering sampled 6 sites
  - 965 samples, 18 media types
    - $\text{ClO}_4^-$  detected in both abiotic and biotic matrices at all sites
    - vegetation > animal tissues
    - correlation between surface water and other media types
- **Smith *et al.* 2001. *Ecotoxicology* 10:305-313.**  
**Preliminary Assessment of LHAAP**
  - significant exposure among aquatic **and** terrestrial organisms

...Yes



# Sources of Exposure among Terrestrial Organisms

- Deposition to soil from source
- Waste water spillage
- Streams contaminated by runoff, discharge
- Groundwater upwelling
- Irrigation with contaminated water



# Deposition to soil from source



# Deposition to soil from source

- **LHAAP, Building 25C**
  - Site of perchlorate handling, grinding
  - $[\text{ClO}_4^-]$  in plants > parts per thousand
    - Including roots, stems, leaves, and seeds (dry wt. basis)
  - One of 3 rodent species (harvest mouse) contained perchlorate (ppm range)
    - Perchlorate not detected in shrews or cotton mice
  - Opportunistically collected birds (2/2) contained perchlorate (ppm range)



# Waste water spillage

- **Water treatment facility pipes burst in January 2001**
  - Lowland area near facility received thousands of gallons of perchlorate contaminated water
  - Bird collected with  $[\text{ClO}_4^-]$  in ppm range
  - One of 2 cotton mouse liver composites with  $[\text{ClO}_4^-]$  in ppm range
    - No perchlorate found in stomach contents or kidneys
  - No perchlorate in harvest mice





# Streams contaminated by runoff, discharge



# **Streams contaminated by runoff, discharge**

- **Harrison Bayou received treated groundwater containing perchlorate**
  - **Contaminated water pumped into H.B. prior to installation of biotreatment facility**
  - **One of 2 cotton mouse liver composites with  $[\text{ClO}_4^-]$  in ppb range**
  - **No perchlorate in harvest mice or birds**





# Groundwater upwelling



# Groundwater upwelling

- **Harris Creek**
  - Emerges from NWIRP, spring fed
  - 2/2 *Peromyscus* with elevated  $[\text{ClO}_4^-]$  at spring
  - 1 *Peromyscus*, 6 different species of birds with elevated  $[\text{ClO}_4^-]$  along tributary
    - Including sparrows, phoebes, cardinals, mockingbirds
  - 2/6 house mice, 5/13 cotton rats, and 0 *Peromyscus* with elevated  $[\text{ClO}_4^-]$  collected downstream on Harris Creek



# Ongoing research

- **Risks of exposure from crops grown with contaminated irrigation water**
- **In depth analysis of exposure among the rodent community**
  - Including relationship to water, soil, and plant contamination, kidney/liver ratios
- **Assessment of exposure among avian and reptilian species at contaminated sites**

